BEFORE THE STATE OF WASHINGTON
ENERGY FACILITY SITE EVALUATION COUNCIL

IN RE APPLICATION NO. 99-1

SUMAS ENERGY 2 GENERATION FACILITY

EXHIBIT _____ (JL-T)

APPLICANT'S PREFILED DIRECT TESTIMONY

WITNESS # 4: JAMES LITCHFIELD

Q. Please introduce yourself to the Council.

A. My name is James W. Litchfield. I am the President of the Litchfield Consulting Group, Inc. (LCG) based in Portland, Oregon.

Q. What is the subject of your testimony?

A. My direct testimony is intended to address the following subjects:

First, my background and experience.

Second, the need for additional power generating capacity in the Pacific Northwest.

Third, the extent to which new natural gas-fueled generating facilities such as the proposed project will displace less efficient and less environmentally benign power generation facilities during non-peak load periods.

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Fourth, the public policy reasons favoring permitting the Sumas facility so that it can be operated with diesel fuel for short periods of time during times when natural gas supplies are constrained.

Background & Experience

Q. Please describe your background.

A. Since January 1992, I have been the President of LCG, which provides consulting services concerning energy and salmon recovery issues. LCG's clients include public and private utilities, independent power producers, industrial customers, regulatory agencies, and regional planning commissions. My professional focus is in assisting the electric power industry with strategic planning, selection of power supply resources, and negotiating power contracts.

Before forming LCG, I was the Director of Power Planning for the Northwest Power Planning Council from 1981 until January 1992. In that role, I was responsible for managing the Council's technical staff, as well as for designing and implementing new planning techniques that are now known as "Integrated Resource Planning." As the Director of Power Planning, I led the staff in the development of the Integrated Resource Planning methods, and in the collection and analysis of technical, economic and environmental information. My staff and I drafted the Northwest Conservation and Electric Power Plans and their supplements, which were produced in 1983, 1986, 1989 and 1991.

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Before joining the Northwest Power Planning Council, from 1973 to 1981, I was involved in national and regional energy planning and research at Battelle Northwest in Richland, Washington.

I have a Masters degree in Management from MIT, and a Bachelors of Science degree in Civil Engineering from the University of Washington. A copy of my curriculum vitae is provided as Exhibit _____(JL-1).

Q. Have you testified as an expert witness before the Washington Energy Facility Site Evaluation Council (EFSEC) before?

A. Yes. In 1996, I testified as an expert witness concerning power supply and energy planning issues in the EFSEC proceedings concerning the Northwest Regional Energy Project in Creston, Washington.

The Need for Additional Resources

Q. In your expert opinion, is there a need for additional electrical power generating capacity in the Pacific Northwest?

A. Yes. Despite improvements in energy efficiency, the demand for electric energy continues to grow in the Pacific Northwest. With this growing demand comes the need for additional power supply. This need for additional electrical resources is addressed in greater detail in my report, which is provided as Exhibit ____ (JL-2), but I will attempt to summarize some of that material here.

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The simplest and most straightforward way to evaluate the need for additional power supply is to compare the demand for electricity with the available supply, or to use the terminology of the industry, you would look at the "load-resource balance." In the Pacific Northwest, two entities – the Bonneville Power Administration (BPA) and the Pacific Northwest Utilities Conference Committee (PNUCC) -- produce comprehensive reports containing load and resource data. This data is collected and published each year to precisely track the need for additional generating resources.

BPA publishes an annual report known as the White Book. The most recent White Book was issued in September 1999. For the year 2000, it forecasts a regional load of 23,691 MWa[1] and an aggregate regional generating resource that totals 21,060 MWa, which means there is a deficit of 2,631 MWa. BPA predicts the current deficit will increase in the future. By the year 2008, for example, BPA forecasts a regional load of 24,165 MWa and regional generation of 20,539 MWa, which means it is forecasting a regional deficit of 3,626 MWa. The following figure compares BPA's load and supply forecasts, and illustrates the growing deficit.

[1] Electric power planning in the Pacific Northwest is primarily constrained by the average annual energy consumed in the region because of the large amount of hydropower generation. Hydroelectric generation is limited by the amount of water in storage behind the region's dams. Thus the most important characteristic that defines the need for new power producing resources in the region is the amount of energy consumed in any year. This is measured in average annual megawatts or MWa.

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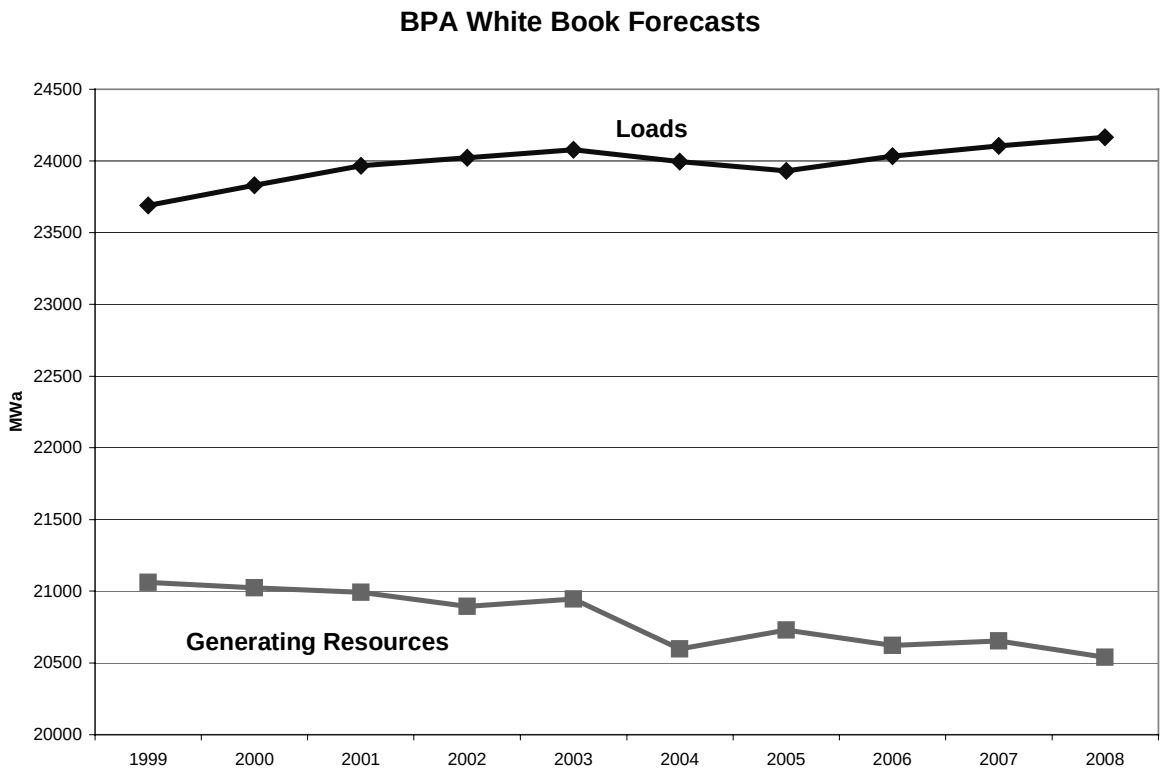

PNUCC also prepares annual forecasts of loads and resources, which it publishes in the Northwest Regional Forecast (NRF). The most recent NRF will be issued in the spring of this year, however at the time I prepared this testimony, the results have not been finalized. Based on the 1999 NRF predictions for the operating year 2000/01, the regional load is forecast to be 25,244 MWa and regional generation is estimated to be 21,589 MWa, which means last year's NRF was forecasting a regional deficit of 3,655 MWa. Preliminary results from the 2000 NRF indicate that this deficit has increased to 4066 MWa. The 2000 NRF is expected to be available by the end of April. Like BPA, PNUCC also predicts that this deficit will grow. For example, by

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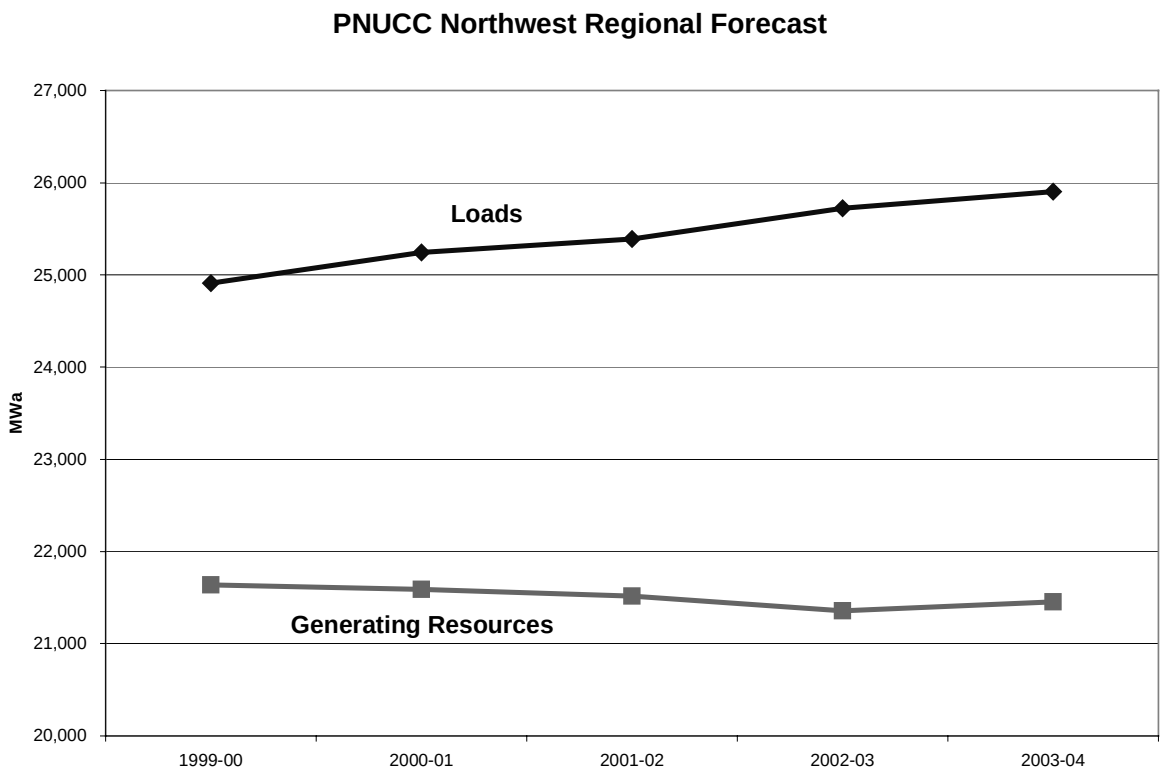
the operating year 2003, the 1999 NRF forecasts a load of 25,906 MWa and a regional resource of 21,452 MWa, which means it is forecasting a regional deficit of 4,454 MWa. The following figure compares PNUCC's load and resource forecasts, and illustrates the growing deficit.



As I explain in my report, the differences in the numbers between BPA and PNUCC have to do with the way each of those entities calculates loads and resources, the purposes for which the forecasts are used, and the way each entity defines the region.

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The important point is that both groups agree that the need for electricity in the Northwest is growing faster than the region's capability to produce or import that electricity.

Q. You have testified that there is a growing gap between power loads and power resources in the region. Can you explain what that means for the citizens of Washington.

A. Among other things, it means that it is becoming increasingly likely that the electricity will not be available to meet all demands, especially during high demand periods such as a cold snap. The physical laws that govern electricity require the supply of electricity to precisely equal the load or demand for electricity at every point in time. This mean that, at any given moment, if there is more demand for electricity than can be met by the available supply either (a) some electricity users would have to curtail their use of electricity, or (b) the electric system will crash, as it did on the East Coast of the United States in the 1980's when brown-outs and black-outs occurred.

Rather than merely comparing average annual loads and resources, the Northwest Power Planning Council (NWPPC) has been developing a new model that allows it to assess the reliability of the power system. Based on this model, the NWPPC concluded that there is a 24 percent probability that the system will be unable to satisfy loads during the winter months. In the electric power industry, this is called a "loss of load probability." The NWPPC recommends that the region's power system should be designed so that there is no more than a 5 percent loss of load probability. The Council has further estimated that in order to achieve the 5 percent standard, the

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region would need to develop approximately 3000 MW of new power generating capacity.

Q. You said that the possibility of a loss of load is one of the effects of the growing load-resource deficit. Are there other effects?

A. Yes. There are at least two important effects. First, the price of electricity will likely be higher and more volatile than it would be if more generating capacity were available. To the extent that demand exceeds supply in a competitive market, it will push up electricity prices. And, to the extent that electricity must be transmitted from more distant locations, the higher costs and electrical losses associated with longer transmission distances will also tend to increase electricity prices.

Second, as the gap between loads and resources widens, the region must use our hydroelectric projects to their fullest. The more the region's power system is dependent upon hydroelectricity to meet loads and prevent blackouts, the less flexibility the region has to manage those hydroelectric projects in ways that will benefit salmon and other fish and wildlife.

Q. Some people have suggested that Washington State does not need another power plant, and that if one is built it will just be used to send power to California. Do you agree with that claim?

A. No. Washington State needs more electric generating capacity to supply the electricity needs in Washington State. In January 1999, the Washington Department of Community Trade and Economic Development (CTED) issued its 1999 Biennial

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Energy Report and that report illustrates the growing electric power demand in Washington State. (Excerpts from that report are provided as Exhibit ____ (JL-3).) CTED and the Washington Utilities and Transportation Commission also issued a report to the Washington Legislature at the end of 1998 that concluded that the likelihood of electricity shortages occurring in Washington is growing. (Excerpts from that report are provided as Exhibit ___ (JL-4).)

Q. Some people have also suggested that Washington State does not need another power plant because Washington can always import electricity produced somewhere else if we need more electricity. Do you agree with that claim?

A. No. The ability for Washington to import more power from outside the state is completely dependent on two separate factors. First is the availability of high voltage transmission to import power from elsewhere. The power transmission lines that allow Washington to import power are capacity limited. This type of capacity constraint limits the amount of power that can be imported at any given time. This constraint on the region's ability to import electric power is critical to the determination of our system's reliability. It is precisely for this reason that the Council takes this limitation explicitly into account. There are also transmission constraints that limit the amount of power that can be moved between areas within the region. The limitations on the ability to import power into Puget Sound continue to be particularly constraining. The available transmission capacity into Puget Sound over the Cascades and up the I-5 corridor has been studied by BPA and the region's utilities since the late 1980s when the Puget Sound reinforcement study focused on trying to relieve this constraint to increase reliability in the area. However, at some

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times of the year these transmission facilitates are again becoming loaded to capacity and there will be increasing problems importing power into the Puget Sound area due to limitations on electric power transmission into one of the fastest growing areas in the region.

The second factor that will limit Washington's ability to import power is the load-resource balance throughout the western US and Canada. The problems with power supply in the northwest are not unique to our area. There has been very little new construction of power plants due to the restructuring of the electric power industry. For this reason, there are likely to be power supply problems outside of Washington at the very time when electrical demand is peaking in the state. At a minimum, this will make the price of power very expensive for Washington customers and it may make it unavailable if the generation owned by others is being fully utilized to meet loads in other regions.

Q. In your expert opinion, should EFSEC recommend the construction of additional power plants in Washington?

A. Yes. The needs of consumers in Washington State require the addition of new power supplies and the transition to competitive power markets protect consumers from the risks of building too many power plants. The addition of new power supplies will reduce the market price of power for all consumers, while the risks of over development are borne by the resource developers.

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There is also an environmental reason for developing new power plants. New plants, like the one proposed by NESCO, will be substantially more efficient than older power plants that are currently meeting loads. By modernizing the power plants in Washington, the amount of fuel consumed and the environmental impacts of the power plant's emissions can be greatly reduced. By permitting new efficient power plants, EFSEC can reduce the environmental damages that are currently being created by the older dirtier power plants that are operating to meet some of the needs of Washington consumers.

A More Efficient, More Environmental Power Plant

Q. Having concluded that more electrical power generating capacity is needed in the Northwest, in your expert opinion, is the proposed SE2 project the sort of power plant that should be built?

A. Yes. Although we should continue to try to conserve energy and explore alternative energy sources such as wind and solar power, additional large-scale power projects will be required to satisfy the growing Washington loads. At this time, the only feasible and cost-effective choices for large-scale power projects are based on the combustion of fossil fuels. In light of current concerns about endangered fish species, hydroelectric power production in the region will continue to decline and new large-scale hydroelectric projects can not be built due to a lack of available sites on undamed rivers. No one is proposing the construction of new nuclear power plants because they are too expensive, they take too long to construct and they remain unacceptable to the public. This leaves fossil fuel power plants as the only real option for large-scale electric power production. Combined-cycle natural gas-fired

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combustion turbine plants, such as the proposed SE2 facility, are the most efficient, cost-effective and environmentally benign of all of the fossil fuel power plant technologies.

Q. How does the efficiency of the proposed project compare to other power plants?

A. The SE2 facility will operate at an efficiency of 51-53%. That compares to existing combined-cycle natural gas facilities that operate at around 45 %, and older natural gas-fired facilities that operate at around 35 %. In contrast, a typical coal-fired power plant operates at about 30 % efficiency.

Q. What does this higher efficiency mean to residents of Washington?

A. Quite simply, it means that the same amount of fuel will produce more electricity. Or, the other way of looking at it, is that the same amount of electricity can be produced using less fuel. That also means that on an incremental basis the electricity is cheaper to produce. Lower incremental cost resources will compete with other resources in the competitive marketplace to lower market prices. This will provide benefits for consumers. Lower market prices will only allow the most efficient power plants to operate thus displacing the older, less efficient power plants during most times of every year. This will reduce power prices for all consumers, and will produce less pollution and greenhouse gases than if Washington continues to rely on the less efficient older power plants currently meeting loads.

Q. You also testified that natural-gas fired power plants are more environmentally friendly than other fossil fuel alternatives. Could you explain that?

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A. In the Northwest Power Planning and Conservation Act that formed the Northwest Power Planning Council, natural gas-fired power plants are given higher priority than all other thermal power plants. Congress and the Council chose this higher priority because natural gas burns cleaner than either fuel oil or coal. The cleanliness of natural gas results primarily because of its simple chemical structure, which allows the use of better technologies for reducing air emissions. The combination of better environmental control technologies and high fuel use efficiency has made combustion turbines the technology of choice throughout the world, but especially in the United States were nuclear and coal are seen as particularly unacceptable.

Q. Would the construction and operation of the SE2 displace some of the older less efficient and more polluting power plants?

A. Yes, although this is a more complicated issue than it may appear on first glance.

As I explained previously, one of the key physical laws is that at each instant the amount of electricity produced must exactly equal to the amount of electricity consumed. Another important feature of electric power is that, with only a few limited exceptions, it cannot be stored. This inability to store electricity further reinforces the critical importance of the law that supply and demand of electric power must be continuously and instantaneously in balance.

At the same time that these physical laws are operating, economic laws operate as well. Market competition encourages the lowest cost resources to operate at any given power price. This occurs by market prices working up the supply curve of all

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available generators until enough generators choose to operate so that supply is balanced with demand. SE2 will be among the lowest incremental cost generators because it is designed with the latest technology placing it among the highest in thermal efficiency. This means that at any given market price for natural gas, SE2 will be able to produce electric power at a lower cost than most other competing generators. This will allow SE2 to more frequently win the competition and operate, thus displacing less efficient, higher cost generators with higher emissions.

Q. Before we leave this point, please clarify something that may be confusing to some people. First you testified that there was not enough electric power in the region. Now you are saying that once the SE2 plant is built, it will displace some electricity produced by existing facilities, which makes it sound like there would be a surplus of electricity. How can both of these things be true?

A. The regional deficit is an imbalance between the annual capability of all energy generation in the region and forecasts of regional loads. This is an energy deficit on an annual basis but it is not an energy shortage at all times of the year. Energy shortages will occur only during events that cause electricity demand to peak and stay high. In the past, these events are usually cause by a cold weather snap combined with a poor water year so that we are limited in the amount of hydropower that can be produced. However, even during a year when there could be actual power shortages during the winter there will be substantial periods of the year when there will actually be power generation available in excess of loads. It is during these surplus time periods that competitive power market prices will drop, and newer more efficient plants will displace the less efficient and dirtier power plants. During an energy

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crisis, all available power plants will be call upon to try to meet load no matter how inefficient, expensive or dirty.

Back-Up Operation with Diesel Fuel

Q. Are you aware that SE2 is seeking a Site Certification Agreement that would permit the facility to be operated using low sulfur diesel fuel for up to 15 days per year?

A. Yes. My understanding is that they want to allow for the possibility that the natural gas supply for the power plant might be curtailed during a cold snap, when there is a high residential demand for both natural gas and electric power.

Q. Is this sort of back-up fuel supply unusual?

A. No, not at all. It is very common in the industry. It would be somewhat unusual if this power plant did not have a plan to operate on back-up fuel because power plants of this size are critical to the stability and reliability of the power system. As a critical facility, it only makes sense to provide an emergency backup so that operations can be sustained if there is a fuel supply interruption. The ability of combustion turbines to operate on a wide range of fuels is one of the reasons that this technology has become dominant in the electric power industry.

Q. What's the reason why a power plant like the SE2 facility should have a back-up fuel supply?

A. It is really a public policy matter. During a cold snap, there is an increased demand for both electricity and natural gas. Power plants such as SE2 would likely be

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operating a capacity to provide electric power to meet the increased demand related to residential heating needs based on electric heat. At the same time, there would also be increased demand for natural gas to meet other residential heating needs based on natural gas furnaces. The capacity of the natural gas pipelines is limited. Critical power supplies typically have a back-up source of fuel – such a diesel fuel – that can be used to maintain power plant operations so that electricity can be produced during a cold snap. This provides society with increased reliability because if SE2 can switch to stored diesel fuel they can free up capacity on the natural gas pipelines so that more natural gas will be available for residential customers.

END OF TESTIMONY

I declare under penalty of perjury that the foregoing testimony is true and correct to the best of my knowledge.

DATED: April _____, 2000.

By _____
James W. Litchfield

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